CLAIMS

1. A method comprising:
providing a first and a second fluid maintained separately from each other in a common vessel;
transferring the first and second fluids in series from the vessel to a reaction site to carry out a predetermined chemical or biochemical reaction; and
avoiding contact between the first and second fluids, at least until after the fluids have been applied to the reaction site.

2. The method of claim 1 further comprising connecting the vessel to a device comprising the reaction site.

3. The method of claim 1 wherein the vessel and reaction site are in fluid communication.

4. The method of claim 3 wherein the vessel and reaction site are on a common platform.

5. The method of claim 3 wherein the vessel and reaction site are integrally connected.

6. The method of claim 1 wherein the vessel comprises a tube.

7. The method of claim 1 further comprising applying a pressure differential across the reaction site.

8. The method of claim 7 wherein the pressure differential is provided by suction on a downstream side of the reaction site.

9. The method of claim 1 wherein the pressure differential is provided by a pump on an upstream side of the reaction site.

10. The method of claim 1 wherein the first and second fluids are transferred in series to the reaction site without actuating a valve.

11. The method of claim 1 wherein the first and second fluids are transferred in series to the reaction site without actuation of any device that controls the rate, the order, or timing of introduction of either of the first and second fluids, relative to each other, to the reaction site.

12. The method of claim 1 wherein the method does not use electrical power.

13. The method of claim 1 wherein the device is a microfluidic device.

14. The method of claim 1 wherein the vessel is comprised of polyethylene, polypropylene or PTFE.

15. The method of claim 1 wherein at least one of an antibody or an antigen is associated with the reaction site.

16. The method of claim 1 wherein the first and second fluids are separated by a third fluid.

17. The method of claim 12 wherein the third fluid is a gas or a gaseous mixture.

18. The method of claim 13 wherein the second fluid is a rinse solution.

19. The method of claim 1 further comprising disposing a sample in the device prior to applying the first and second fluids to the reaction site.

20. The method of claim 1 further comprising disposing a sample in the vessel.

21. The method of claim 16 wherein the sample is disposed in the vessel prior to connecting the vessel to the device.

22. The method of claim 1 wherein the second fluid is produced by combining a third fluid and a fourth fluid.

23. The method of claim 18 wherein the fourth fluid reacts with the third fluid.

24. The method of claim 19 wherein the third and fourth fluids are combined after connecting the vessel to the device.

25. The method of claim 1 wherein the vessel includes a seal.

26. The method of claim 25 wherein the seal is made by melting, capping, or shrinking an opening in the vessel.

27. The method of claim 25 wherein the seal is made by inserting a non-volatile fluid into an opening in the vessel.

28 The method of claim 5 wherein the tube has a length to inner diameter ratio of at least 10:1.

29. The method of claim 5 wherein the tube has an inner diameter of less than 5 millimeters.

30. The method of claim 5 wherein the tube has an inner diameter of less than 1 millimeter.

31. The method of claim 5 wherein the tube has an inner diameter of less than 500 microns.

32. The method of claim 5 wherein the tube has an inner diameter of less than 200 microns.

33. The method of claim 5 wherein the tube has an inner diameter of less than 100 microns.

34. The method of claim 1 wherein one of the fluids comprises a gold conjugated antibody.

35. The method of claim 1 wherein one of the fluids comprises a metal precursor.

36. The method of claim 35 further comprising electrolessly depositing metal at the reaction site to produce an opaque material.

37. The method of claim 36 further comprising determining light absorbance or transmission through the opaque material.

38. The method of claim 35 further comprising electrolessly depositing a metal and determining an electrical property of the metal.

39. An apparatus comprising:
a sealed vessel;
a first static fluid disposed in the vessel;
a second static fluid disposed in the vessel; and
a third static fluid disposed in the vessel, wherein the third fluid separates the first and second fluids, and at least the first and second fluids are selected for use in a predetermined chemical or biological reaction in a predetermined sequence.

40. The apparatus of claim 39 wherein the first and second fluids are liquids.

41. The apparatus of claim 39 wherein the third fluid is a gas or a gaseous mixture.

42. The apparatus of claim 41 wherein the third fluid is air.

43. The apparatus of claim 41 wherein the third fluid is nitrogen.

44. The apparatus of claim 39 further comprising additional distinct fluids.

45. The apparatus of claim 44 wherein the additional distinct fluids are of the same type as either the first fluid or the second fluid.

46. The apparatus of claim 39 wherein at least one of fluid 1 or fluid 2 comprises a chemical or biochemical agent.

47. The apparatus of claim 39 wherein at least one of fluid 1 or fluid 2 comprises a rinse solution.

48. The apparatus of claim 39 wherein the vessel and the first, second, and third fluids are selected such that the vessel and fluids disposed therein can be stored for a period of at least one day and can be handled under normal packaging and shipping conditions while maintaining the fluids in predetermined positions relative to each other within the vessel, without detriment to the fluids' ability to participate in the predetermined chemical or biological reaction.

49. The apparatus of claim 48 wherein the first, second, and third fluids are selected such that the vessel and fluids disposed therein can be stored for a period of at least one week.

50. The apparatus of claim 48 wherein the first, second, and third fluids are selected such that the vessel and fluids disposed therein can be stored for a period of at least one month.

51. The apparatus of claim 48 wherein the first, second, and third fluids are selected such that the vessel and fluids disposed therein can be stored for a period of at least one year.

52. The apparatus of claim 39 wherein the vessel is comprised of a polymeric material.

53. The apparatus of claim 52 wherein the polymeric material is selected from polyethylene, polypropylene and PTFE.

54. The apparatus of claim 39, wherein at least one of the first and second fluids contains a species capable of participating in a biological or chemical assay.

55. The apparatus of claim 39, wherein at least one of the first and second fluids contains a species capable of participating in a biological assay, and the third fluid is inert with respect to the assay and is selected to separate the first and second fluids and to prevent them from mixing.

56. The apparatus of claim 39 wherein the vessel is a tube having a length to internal diameter ratio of the at least 10:1.

57. The apparatus of claim 56 wherein the tube is convoluted.

58. The apparatus of claim 39 wherein the vessel is heat-sealable.

59. A method comprising:
flowing a first fluid into a vessel;
flowing a second fluid into the vessel, the second fluid being substantially immiscible with the first fluid;

flowing a third fluid into the vessel, wherein the third fluid is substantially immiscible with the second fluid and wherein the third fluid is not contacting the first fluid; and

sealing the fluids in the vessel.

60. The method of claim 59 wherein the vessel comprises a tube.

61. The method of claim 59 wherein each of the first and third fluids form fluid plugs in the vessel.

62. The method of claim 61 further comprising forming additional fluid plugs in the vessel.

63. The method of claim 59 wherein the first and third fluids are liquids and the second fluid is a gas or a gaseous mixture.

64. The method of claim 63 wherein at least one of the first and third fluids comprises a chemical or biochemical agent.

65. The method of claim 64 wherein at least one of the first and third fluids is a biochemical agent.

66. The method of claim 59 further comprising storing the sealed vessel for greater than one day.

67. The method of claim 60 wherein the tube is comprised of a polymer.

68. The method of claim 67 wherein the ratio of the length of the tube to the internal diameter of the tube is at least 10:1.

69. The method of claim 67 wherein the tube is convoluted.

70. An apparatus comprising:

a sealed vessel comprising a chamber, defining a continuous void, containing a first fluid and a second fluid, the first and second fluids constructed and arranged to be deliverable from the vessel separately for sequential use in a predetermined chemical or biological reaction wherein the sealed vessel is constructed and arranged for storing the first and second fluids for at least one hour prior to use of the first and second fluids in the predetermined chemical or biological reaction.

71. The apparatus of claim 70 wherein the sealed vessel is constructed and arranged for storing the first and second fluids for at least one day prior to use of the first and second fluids in the predetermined chemical or biological reaction.

72. The apparatus of claim 70 wherein the sealed vessel is constructed and arranged for storing the first and second fluids for at least one week prior to use of the first and second fluids in the predetermined chemical or biological reaction.

73. The apparatus of claim 70 wherein the sealed vessel is constructed and arranged for storing the first and second fluids for at least one year prior to use of the first and second fluids in the predetermined chemical or biological reaction.

74. The apparatus of claim 70 wherein the sealed vessel is constructed and arranged to be transported from a first location to a second location

75. A method comprising providing the apparatus of claim 70 and storing the apparatus for more than one day.

76. The method of claim 75 wherein the apparatus is stored at a temperature equal to or below 4 degrees C.

77. The method of claim 75 wherein at least one of the fluids is frozen.

78. An assay kit comprising:
a surface including a microfluidic channel;
at least one of an antibody or an antigen associated with a portion of the microfluidic channel;
a vessel;
a first static fluid disposed in the vessel, the first static fluid comprising a metal colloid associated with an antibody or an antigen;
a second static fluid disposed in the vessel, the second static fluid comprising a metal precursor;
a third static fluid disposed in the vessel, wherein the third fluid separates the first and second fluids and
instructions for performing the assay.

79. The assay kit of claim 78 wherein the vessel is disposed on the surface.

80. The assay kit of claim 78 wherein the vessel is constructed and arranged to be capable of being placed in fluid communication with the microfluidic channel.

81. A method comprising:
providing a first and a second fluid statically maintained separately from each other in a common vessel for greater than one minute;
applying in series the first and second fluid to a reaction site; and
avoiding contact between the first and second fluids, at least until after the fluids have been applied to the reaction site.

82. The method of claim 81 wherein the first and second fluids are statically maintained for greater than one day.

83. The method of claim 81 wherein the first and second fluids are separated.

84. The method of claim 81 wherein a component of the first fluid becomes associated with the reaction site and a component of the second fluid becomes associated with the component of the first fluid.

85. A method comprising:
providing a first and a second fluid maintained separately from each other in a common vessel;
transferring the first and second fluids in series from the vessel to a reaction site to carry out a predetermined chemical or biochemical reaction;
allowing a component of the first fluid to become associated with the reaction site; and
allowing a component of the second fluid to become associated with the component of the first fluid.

86. The method of claim 85 further comprising statically maintaining the first and second fluids in the common vessel.

87. The method of claim 85 wherein the first and second fluids are separated by at least a third fluid.

88. The method of claim 85 wherein the first fluid comprises one of an antibody or antigen and the second fluid comprises the other of an antibody or antigen.

89. The method of claim 85 wherein the first fluid comprises a gold conjugated antibody and the second fluid comprises a metal precursor.

90. The method of claim 85 wherein the first fluid comprises an antibody and the second fluid comprises a signaling entity.

AMENDED CLAIMS

[Received by the International Bureau on 29 June 2005 (29.06.05):
original claims 1-90 replaced by amended claims 1-92 (10 pages)]

1. A method comprising:

providing a first and a second fluid maintained separately from each other in a common vessel;

transferring the first and second fluids in series from the vessel to a reaction site to carry out a predetermined chemical or biochemical reaction; and

avoiding contact between the first and second fluids, at least until after the fluids have been applied to the reaction site.

2. The method of claim 1 further comprising connecting the vessel to a device comprising the reaction site.

3. The method of claim 1 wherein the vessel and reaction site are in fluid communication.

4. The method of claim 3 wherein the vessel and reaction site are on a common platform.

5. The method of claim 3 wherein the vessel and reaction site are integrally connected.

6. The method of claim 1 wherein the vessel comprises a tube.

7. The method of claim 1 further comprising applying a pressure differential across the reaction site.

8. The method of claim 7 wherein the pressure differential is provided by suction on a downstream side of the reaction site.

9. The method of claim 1 wherein the pressure differential is provided by a pump on an upstream side of the reaction site.

10. The method of claim 1 wherein the first and second fluids are transferred in series to the reaction site without actuating a valve.

11. The method of claim 1 wherein the first and second fluids are transferred in series to the reaction site without actuation of any device that controls the rate, the order, or timing of introduction of either of the first and second fluids, relative to each other, to the reaction site.

12. The method of claim 1 wherein the method does not use electrical power.

13. The method of claim 1 wherein the device is a microfluidic device.

14. The method of claim 1 wherein the vessel is comprised of polyethylene, polypropylene or PTFE.

15. The method of claim 1 wherein at least one of an antibody or an antigen is associated with the reaction site.

16. The method of claim 1 wherein the first and second fluids are separated by a third fluid.

17. The method of claim 12 wherein the third fluid is a gas or a gaseous mixture.

18. The method of claim 13 wherein the second fluid is a rinse solution.

19. The method of claim 1 further comprising disposing a sample in the device prior to applying the first and second fluids to the reaction site.

20. The method of claim 1 further comprising disposing a sample in the vessel.

21. The method of claim 16 wherein the sample is disposed in the vessel prior to connecting the vessel to the device.

22. The method of claim 1 wherein the second fluid is produced by combining a third fluid and a fourth fluid.

23. The method of claim 18 wherein the fourth fluid reacts with the third fluid.

24. The method of claim 19 wherein the third and fourth fluids are combined after connecting the vessel to the device.

25. The method of claim 1 wherein the vessel includes a seal.

26. The method of claim 25 wherein the seal is made by melting, capping, or shrinking an opening in the vessel.

27. The method of claim 25 wherein the seal is made by inserting a non-volatile fluid into an opening in the vessel.

28 The method of claim 5 wherein the tube has a length to inner diameter ratio of at least 10:1.

29. The method of claim 5 wherein the tube has an inner diameter of less than 5 millimeters.

30. The method of claim 5 wherein the tube has an inner diameter of less than 1 millimeter.

31. The method of claim 5 wherein the tube has an inner diameter of less than 500 microns.

32. The method of claim 5 wherein the tube has an inner diameter of less than 200 microns.

33. The method of claim 5 wherein the tube has an inner diameter of less than 100 microns.

34. The method of claim 1 wherein one of the fluids comprises a gold conjugated antibody.

35. The method of claim 1 wherein one of the fluids comprises a metal precursor.

36. The method of claim 35 further comprising electrolessly depositing metal at the reaction site to produce an opaque material.

37. The method of claim 36 further comprising determining light absorbance or transmission through the opaque material.

38. The method of claim 35 further comprising electrolessly depositing a metal and determining an electrical property of the metal.

39. An apparatus comprising:

a sealed vessel;

a first static fluid disposed in the vessel;

a second static fluid disposed in the vessel; and

a third static fluid disposed in the vessel, wherein the third fluid separates the first and second fluids, and at least the first and second fluids are selected for use in a predetermined chemical or biological reaction in a predetermined sequence, and wherein the vessel and the first, second, and third fluids are selected such that the vessel and fluids disposed therein can be stored for a period of at least one day and can be handled under normal packaging and shipping conditions while maintaining the fluids in predetermined positions relative to each other within the vessel, without detriment to the fluids' ability to participate in the predetermined chemical or biological reaction.

40. The apparatus of claim 39 wherein the first and second fluids are liquids.

41. The apparatus of claim 39 wherein the third fluid is a gas or a gaseous mixture.

42. The apparatus of claim 41 wherein the third fluid is air.

43. The apparatus of claim 41 wherein the third fluid is nitrogen.

44. The apparatus of claim 39 further comprising additional distinct fluids.

45. The apparatus of claim 44 wherein the additional distinct fluids are of the same type as either the first fluid or the second fluid.

46. The apparatus of claim 39 wherein at least one of fluid 1 or fluid 2 comprises a chemical or biochemical agent.

47. The apparatus of claim 39 wherein at least one of fluid 1 or fluid 2 comprises a rinse solution.

48. Cancelled.

49. The apparatus of claim 48 wherein the first, second, and third fluids are selected such that the vessel and fluids disposed therein can be stored for a period of at least one week.

50. The apparatus of claim 48 wherein the first, second, and third fluids are selected such that the vessel and fluids disposed therein can be stored for a period of at least one month.

51. The apparatus of claim 48 wherein the first, second, and third fluids are selected such that the vessel and fluids disposed therein can be stored for a period of at least one year.

52. The apparatus of claim 39 wherein the vessel is comprised of a polymeric material.

53. The apparatus of claim 52 wherein the polymeric material is selected from polyethylene, polypropylene and PTFE.

54. The apparatus of claim 39, wherein at least one of the first and second fluids contains a species capable of participating in a biological or chemical assay.

55. The apparatus of claim 39, wherein at least one of the first and second fluids contains a species capable of participating in a biological assay, and the third fluid is inert with respect to the assay and is selected to separate the first and second fluids and to prevent them from mixing.

56. The apparatus of claim 39 wherein the vessel is a tube having a length to internal diameter ratio of the at least 10:1.

57. The apparatus of claim 56 wherein the tube is convoluted.

58. The apparatus of claim 39 wherein the vessel is heat-sealable.

59. A method comprising:

flowing a first fluid into a vessel;

flowing a second fluid into the vessel, the second fluid being substantially immiscible with the first fluid;

flowing a third fluid into the vessel, wherein the third fluid is substantially immiscible with the second fluid and wherein the third fluid is not contacting the first fluid;

sealing the fluids in the vessel; and

storing the sealed vessel for greater than one day.

60. The method of claim 59 wherein the vessel comprises a tube.

61. The method of claim 59 wherein each of the first and third fluids form fluid plugs in the vessel.

62. The method of claim 61 further comprising forming additional fluid plugs in the vessel.

63. The method of claim 59 wherein the first and third fluids are liquids and the second fluid is a gas or a gaseous mixture.

64. The method of claim 63 wherein at least one of the first and third fluids comprises a chemical or biochemical agent.

65. The method of claim 64 wherein at least one of the first and third fluids is a biochemical agent.

66. Cancelled.

67. The method of claim 60 wherein the tube is comprised of a polymer.

68. The method of claim 67 wherein the ratio of the length of the tube to the internal diameter of the tube is at least 10:1.

69. The method of claim 67 wherein the tube is convoluted.

70. An apparatus comprising:

a sealed vessel comprising a chamber, defining a continuous void, containing a first fluid and a second fluid, the first and second fluids constructed and arranged to be deliverable from the vessel separately for sequential use in a predetermined chemical or biological reaction wherein the sealed vessel is constructed

and arranged for storing the first and second fluids for at least one hour prior to use of the first and second fluids in the predetermined chemical or biological reaction.

71. The apparatus of claim 70 wherein the sealed vessel is constructed and arranged for storing the first and second fluids for at least one day prior to use of the first and second fluids in the predetermined chemical or biological reaction.

72. The apparatus of claim 70 wherein the sealed vessel is constructed and arranged for storing the first and second fluids for at least one week prior to use of the first and second fluids in the predetermined chemical or biological reaction.

73. The apparatus of claim 70 wherein the sealed vessel is constructed and arranged for storing the first and second fluids for at least one year prior to use of the first and second fluids in the predetermined chemical or biological reaction.

74. The apparatus of claim 70 wherein the sealed vessel is constructed and arranged to be transported from a first location to a second location

75. A method comprising providing the apparatus of claim 70 and storing the apparatus for more than one day.

76. The method of claim 75 wherein the apparatus is stored at a temperature equal to or below 4 degrees C.

77. The method of claim 75 wherein at least one of the fluids is frozen.

78. An assay kit comprising:

a surface including a microfluidic channel;

at least one of an antibody or an antigen associated with a portion of the microfluidic channel;

a vessel;

a first static fluid disposed in the vessel, the first static fluid comprising a metal colloid associated with an antibody or an antigen;

a second static fluid disposed in the vessel, the second static fluid comprising a metal precursor;

a third static fluid disposed in the vessel, wherein the third fluid separates the first and second fluids and

instructions for performing the assay.

79. The assay kit of claim 78 wherein the vessel is disposed on the surface.

80. The assay kit of claim 78 wherein the vessel is constructed and arranged to be capable of being placed in fluid communication with the microfluidic channel.

81. A method comprising:

providing a first and a second fluid statically maintained separately from each other in a common vessel for greater than one minute;

applying in series the first and second fluid to a reaction site; and

avoiding contact between the first and second fluids, at least until after the fluids have been applied to the reaction site.

82. The method of claim 81 wherein the first and second fluids are statically maintained for greater than one day.

83. The method of claim 81 wherein the first and second fluids are separated.

84. The method of claim 81 wherein a component of the first fluid becomes associated with the reaction site and a component of the second fluid becomes associated with the component of the first fluid.

85. A method comprising:

providing a first and a second fluid maintained separately from each other in a common vessel;

transferring the first and second fluids in series from the vessel to a reaction site to carry out a predetermined chemical or biochemical reaction;

avoiding contact between the first and second fluids, at least until after the fluids have been applied to the reaction site;

allowing a component of the first fluid to become associated with the reaction site; and

allowing a component of the second fluid to become associated with the component of the first fluid.

86. The method of claim 85 further comprising statically maintaining the first and second fluids in the common vessel.

87. The method of claim 85 wherein the first and second fluids are separated by at least a third fluid.

88. The method of claim 85 wherein the first fluid comprises one of an antibody or antigen and the second fluid comprises the other of an antibody or antigen.

89. The method of claim 85 wherein the first fluid comprises a gold conjugated antibody and the second fluid comprises a metal precursor.

90. The method of claim 85 wherein the first fluid comprises an antibody and the second fluid comprises a signaling entity.

91. A method as in claim 81, comprising applying the first and second fluids to the reaction site from the vessel without action of a component of the vessel.

92. A method as in claim 81, comprising applying the first and second fluids to the reaction site from the vessel via application of gas pressure to the vessel and/or vacuum to a housing of the reaction site.